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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/714,332	11/14/2003	Roger L. Schultz	HES 2002-IP-008558U1	4043

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EXAMINER	
WONG, ALBERT KANG	
ART UNIT	PAPER NUMBER
2612	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/02/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/714,332	SCHULTZ ET AL.	
	Examiner	Art Unit	
	Albert K. Wong	2612	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 November 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-16,18-25,27-43,45-60,62-76,78-95,97-109,111-122 and 124-133* is/are pending in the application.

4a) Of the above claim(s) *122 and 124-133* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-16,18-25,27-43,45-60,62-76,78-95,97-109,and 111-121* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *14 November 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

1. This Office action is in response to the amendment filed November 28, 2006. Claims 1, 3-16, 18-25, 27-43, 45-60, 62-76, 78-95, 97-109, and 111-122 and 124-133 are pending. The prior rejections of the claims under 35 U.S.C. 112, first paragraph, 102, and 103 have been withdrawn in view of the amendment and remarks.

2. Newly submitted claims 122 and 124-133 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: the claims recite a telemetry system where the transceivers are capable of receiving and demodulating a signal and subsequently modulating a new signal using the demodulated signal in real time without buffering.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 122 and 124-133 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

3. Claims 1, 3-14, 23-25, 27-43, 45-60, 62-76, 78-95, 97-109, and 111-121 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rorden (3,967,201) in view of Wikipedia (engineering definition 9/2003).

Regarding claim 1, the claims recite the steps of designing a communication system within a lossy environment by determining the attenuation factor within the environment and selecting the proper frequency and distance to ensure communication of a signal with an attenuation equal to or less than 98%. Rorden shows a completed system with transceivers placed within the lossy environment with a selected frequency and at a distance that permits communication. See figure 1 and the Summary of the Invention. Rorden also teaches the effect

of the environment on the signal as a function of the frequency and the conductivity of the medium. Conductivity is the inverse of resistivity, which is related to the attenuation factor of the media. What Rorden does not teach are the steps of designing the system. Wikipedia defines engineering as utilizing the knowledge of science to find solutions to the problem, to create models, to test for potential solutions, and to evaluate different design choices to choose the solution that best meets the requirements. In the instant case, the solution is a communication system where the transceivers are positioned within the formation with the appropriate signal strength. One of ordinary skill in the art at the time of invention would understand the principles of engineering design. He would also understand the critical function that the formation characteristics would have on the attenuation of the signal. It would have been obvious to employ the design steps recited in the claim to determine the distance between the transceivers since these represent different design choices based on the available parameters. The use of engineering design provides the obvious advantage of optimizing the system and eliminating the need for building and modifying an actual system within the borehole to achieve the desired solution. Further, while Rorden does not teach the design of a system with signal attenuation equal to or less than 98%, the selection of a particular range of attenuation is an obvious design choice. The selection of the permitted percentage determines the degree of resistance to noise in the system and any value that permits communication would permit the system to function.

Regarding claims 3-6, the determination of the distance for various levels of signal attenuation would have been obvious since such information is necessary to properly design a communication system. The signal attenuation determines the amount of power necessary to assure proper communications.

Regarding claim 7, see Rorden, figure 1.

Regarding claims 8-9, it is well recognized that transmissions through a non-air medium constitutes a lossy environment. A mineshaft is analogous to a wellbore and a cave is recognized as a lossy environment. It would have been obvious to use the same steps to create a communication system in any lossy environment.

Regarding claim 10, see Figure 2 of Rorden which shows graphs approximating the claimed transmission frequency range.

Regarding claim 11, Figure 2 of Rorden shows the attenuation with regards to conductivity (which is the inverse of resistivity). Since the two parameters are related, it would have been obvious that one must determine the formation resistivity to predict the attenuation.

Regarding claim 12, the location of a receiver at the surface as shown in Rorden would place a transceiver outside the lossy environment.

Regarding claim 13, see Figure 1 of Rorden.

Regarding claim 14, it would have been obvious to position transceivers at locations with the same signal attenuation so that identical transceivers may be used at each location.

Regarding claim 23, the steps of determining the attenuation factor, selecting the frequency, positioning the transceivers, and transmitting the signal has generally been addressed in claim 12. It would have been obvious to place the transceivers within range to ensure communication.

Regarding claims 24, Rorden teaches the use of transceivers within the lossy environment to transmit signals outside the environment.

Regarding claim 25, the use of transceivers as relays is well known in the art. It would have been obvious to use a transceiver as a relay to extend the communication range.

Regarding claims 27-32, 34, and 40, these limitations have been addressed in prior claims.

Regarding claim 33, a cave is a lossy environment with a natural opening. The use of a transmission system in a cave has been addressed above.

Regarding claim 35, the determination of the resistivity of the formation is directed toward the path of transmission since other paths would not be of interest.

Regarding claim 36-39, Rorden teaches the determination of an optimum transmission frequency. It would have been obvious to automatically change the frequency to adjust of changing conditions. Within the communication art, it is well know to create a dynamic system that changes frequency or channel compensation factors to optimize communications. Gottlieb teaches that lower frequencies have lower attenuation. Thus, it would have been obvious to switch to lower frequencies when communication is interrupted.

Regarding claim 41, it is conventional for a repeater to retransmit signals on a different frequency to avoid interference since the original signal propagate pass the transceiver for an indeterminate distance.

Regarding claim 42, this is essentially the same as claim 1 with the addition of the transmission step. Rorden teaches the transmission of a signal from a transceiver to another via the lossy environment.

Regarding claims 43 and 45-59, these limitations have been addressed above.

Regarding claim 60, this is essentially the same as claim 15 with the additional steps of transmitting a signal from a surface receiver. The surface transceiver is shown as item 22. Thus, the surface transceiver is able to send command signals through the lossy medium to the receivers below.

Regarding claims 62-75, these limitations have been addressed above.

Regarding claim 76, this claim is essentially the same as claim 60 with the addition of an intermediate transceiver. This is shown as item 18'.

Regarding claims 78-91, these limitations have been addressed above.

Regarding claims 92 and 108, all of the steps have been addressed in prior claims with the exception of the step of forming the passageway/drilling a borehole. The wellbore shown in figure 1 of Rorden obviously requires the step of either forming a passageway through the formation or drilling a borehole.

Regarding claims 93-95, 97-107, 109, and 111-121, these limitations have been addressed above.

4. Claims 15-16 and 18-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rorden and Gottlieb (cited by applicant) in view of Wikipedia.

Regarding claim 15, Rorden teaches the determination of the optimal frequency in a borehole based on the resistivity profile. Transceivers are positioned at given distances and an optimum frequency is selected. The optimum design is based on the following parameters: distance between transmitters, resistivity of the medium, and selected frequency. As shown in figure 1, the resistivity of the borehole is known. This is typically done via a logging process. Rorden does not specifically teach the determination of the attenuation profile for a selected

length. Gottlieb teaches a method for modeling attenuation profile based on parameters from the lossy media. It would have been obvious to use the determination of the attenuation profile to optimized the frequency and placement of the transceivers as suggested by Rorden. Further, one of ordinary skill in the art would be aware of engineering design principles as taught by Wikipedia. Engineering design includes the modeling of a system with the knowledge of design parameters and their effect on the desired functionality. Rorden shows that one of ordinary skill in the art would be aware that frequency and resistivity of the medium affects the transmission distance via signal-to-noise ratio and signal strength. Gottlieb teaches the relationship between resistivity and attenuation. It would have been obvious to use the design steps to determine the positioning of the receivers and the selection of the frequency to optimize the placement of the receivers without the need for empirical testing. Further, while Rorden does not teach the design of a system with signal attenuation equal to or less than 98%, the selection of a particular range of attenuation is an obvious design choice. The selection of the permitted percentage determines the degree of resistance to noise in the system and any value that permits communication would permit the system to function.

Regarding claims 16, and 18-22, these limitations have been addressed above.

Remarks

5. The claims essentially recite the steps for designing a communication system within a lossy environment based upon the attenuation factor or resistivity of the environment. Applicant argues that the particular claimed steps in that design process are not taught or suggested by the art cited by the Examiner. In particular, applicant argues that Rorden positions the receivers and

then selects the optimum frequency. In support of this assertion, applicant cites col. 4, lines 7-18. A reading of the cited sections does not support applicant's characterization of the teaching. Rorden merely concludes that there is an optimum frequency, but does not specify if this is determined after the receivers are placed within the borehole. Rather, the reference clearly suggests that this is determined by a design process instead of an empirical process. Figure 2 shows the relationship of frequency with respect to signal strength and conductivity of the medium. Figures 4 and 5 show the effect of signal strength as a function of conductivity of the medium and distance between receivers. There are all conventional factors used to model and to design a proper communication system. Gottlieb is a further example that modeling is part of the design process and one factor modeled is the attenuation of a signal within a lossy medium.

To support the Examiner's assertion that the engineering design process is well known, the Examiner has cited two definitions from Wikipedia. The first definition was published prior to the filing of the instant application. The second definition is more comprehensive, but was published at a later date. It is asserted that either definition would be sufficient. While the later definition was published after the filing date, it is asserted that the definition of engineering design has not changed for a long period of time and would be known to one of ordinary skill in the art at the time of the invention.

Finally, it is asserted by the Examiner that applicant's characterization of the knowledge of one of ordinary skill in the art at the time of the invention is contrary to basic reasoning. Following applicant's logic, a person of ordinary skill in the art with knowledge of the effect of a lossy medium on signal propagation would ignore such information and place receivers hundreds, if not thousands, of feet underground in a inaccessible location without any idea if

communication is possible. This would appear to be contrary to both logic and knowledge of one of ordinary skill in the art. Thus, for the above reasons, applicant's arguments are not persuasive.

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Albert K. Wong whose telephone number is 571-272-3057. The examiner can normally be reached on M-Th.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wendy Garber can be reached on 571-272-7308. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Albert K. Wong
January 31, 2007

ALBERT K. WONG
PRIMARY EXAMINER